GEPH24C/DEPH24C — NON-LINEAR OPTICS

Time : Three hours   Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. What is a laser?

2. Write the principle of He-Ne laser.

3. Define optical bistability.

4. What do you understand by phase matching?

5. What is the Kerr effect?

6. Why is two photon absorption a third order process?

7. What is the chemical formula of urea?

8. List some of the applications of nonlinear optical materials.

9. Compare step index and graded index fibers.

10. What is dispersion in optical fibers?

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions.

11. (a) Compare ruby and Nd-YAG lasers.

Or

(b) Write a short note on organic dye laser.

12. (a) Explain sum and difference frequency generation.

Or

(b) Briefly discuss the wave propagation in anisotropic crystal.

13. (a) Write a short note on parametric generation of light.

Or

(b) Explain the Foucault effect.

14. (a) Write a short note on inorganic optical materials.

Or

(b) List the criteria for selecting useful nonlinear optical materials.

15. (a) Compare single mode and multi mode optical fiber.

Or

(b) Derive an expression for numerical aperture of an optical fiber.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Explain the construction and working of any semiconductor laser with the help of diagram.

17. Discuss the detail in self focussing of beam in nonlinear medium. Also calculate the focal length of the medium.

18. Write note on stimulated Raman scattering and intensity dependent refractive index.

19. Discuss the various mechanisms that determine laser induced surface damage threshold.

20. Explain various losses in optical fiber.

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